

Corrosion Report



Equipment Location ID 0955-003-001
Equip. Location Descrip. C-1100 OVHD

Remaining Life (Years) 4.99
Retirement Date 01/26/2017
Last Inspection Date 02/01/2012
Next Inspection Date 07/30/2014
Current Corrosion Rate 56.16

DP ID	MEAS METH	DP STAT	DP SZ	DT TYPE	BASE	MEAS 5	MEAS 4	MEAS 3	NEAR	LAST	MIN VALUE	CCR	REM LIFE
001.U	UT	A	36.00	ELL	0.660 02/07					0.560 02/12	0.140	20.06	20.94
002.U	UT	A	36.00	TEE	0.670 02/07					0.670 02/12	0.140	0.00	∞
003.U	UT	A	24.00	RED	0.530 02/07					0.520 02/12	0.140	2.01	189.43
004.U	UT	A	24.00	ELL	0.640 02/07					0.590 02/12	0.140	10.03	44.87
005.U	UT	A	24.00	TEE	0.590 02/07					0.500 02/12	0.140	18.05	19.94
006.U	UT	A	18.00	ELL	0.490 02/07					0.400 02/12	0.140	18.05	14.40
007.U	UT	A	18.00	ELL	0.700 02/07					0.420 02/12	0.140	56.16	4.99
008.U	UT	A	18.00	ELL	0.490 02/07					0.480 02/12	0.140	2.01	169.49
009.U	UT	A	18.00	ELL	0.500 02/07					0.490 02/12	0.140	2.01	174.48
010.U	UT	A	24.00	RED	0.520 02/07					0.520 02/12	0.140	0.00	∞
011.U	UT	A	24.00	ELL	0.600 02/07					0.420 02/12	0.140	36.10	7.76
012.U	UT	A	24.00	TEE	0.560 02/07					0.560 02/12	0.140	0.00	∞
013.U	UT	A	18.00	ELL	0.490 02/07					0.500 02/12	0.140	0.00	∞
014.U	UT	A	18.00	ELL	0.600 02/07					0.400 02/12	0.140	40.12	6.48
015.U	UT	A	18.00	ELL	0.540 02/07					0.500 02/12	0.140	8.02	44.87
016.U	UT	A	18.00	ELL	0.560 02/07					0.520 02/12	0.140	8.02	47.36
022.U	UT	A	8.00	PIPE	0.320 07/76					0.290 05/06	0.140	1.01	149.25
023.U	UT	A	3.00	PIPE	0.300 07/76				0.280 11/04	0.290 05/06	0.100	0.34	567.16

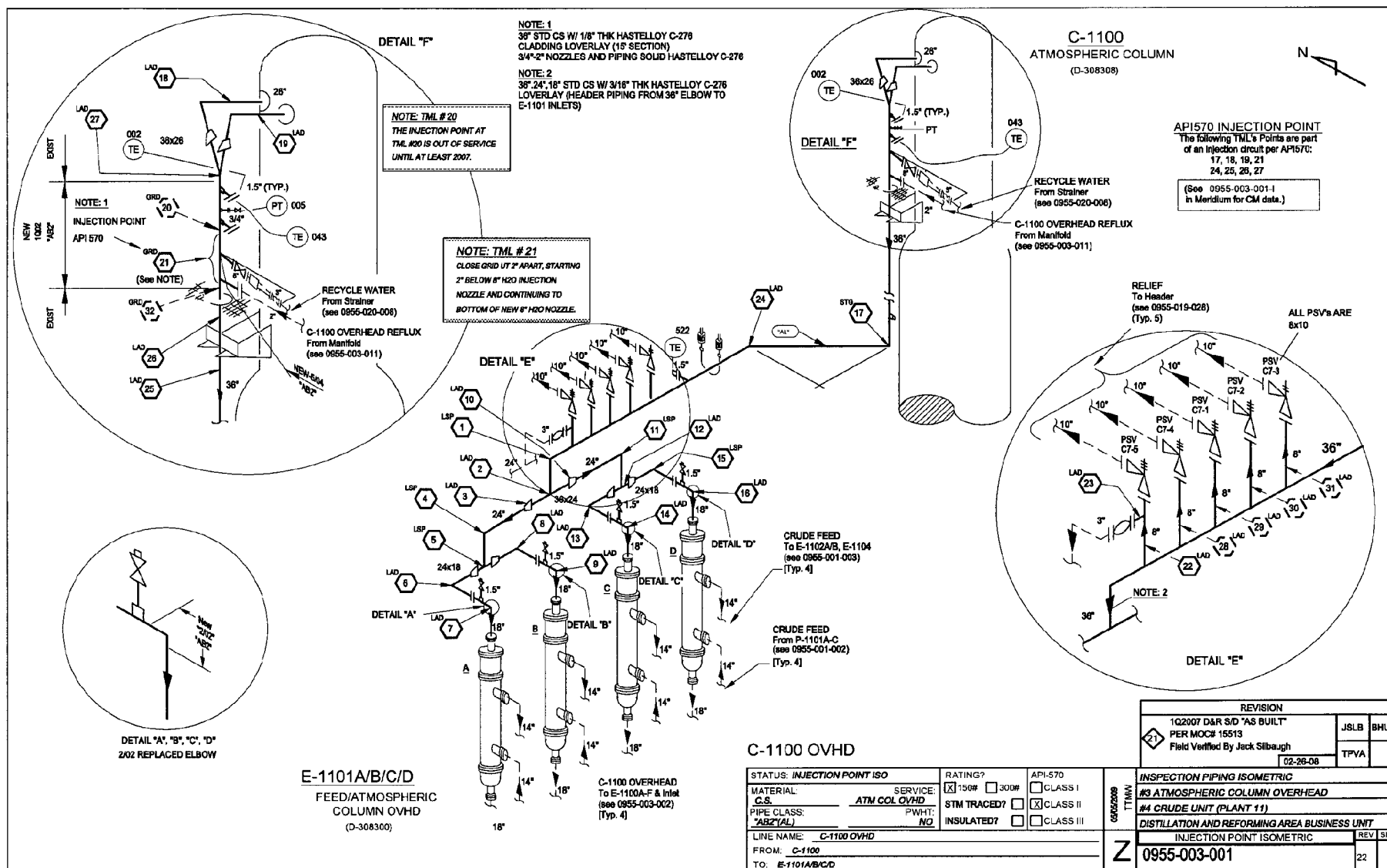
Corrosion Report



Equipment Location ID 0955-003-001-I
Equip. Location Descrip. C-1100 OVHD (C-1100 TO E-1101A/B/C/D)

Remaining Life (Years) 14.86
Retirement Date 01/11/2025
Last Inspection Date 05/09/2011
Next Inspection Date 03/04/2013
Current Corrosion Rate 13.46

DP ID	MEAS METH	DP STAT	DP SZ	DT TYPE	BASE	MEAS 5	MEAS 4	MEAS 3	NEAR	LAST	MIN VALUE	CCR	REM LIFE
017.U	UT	A	36.00	ELL	0.400 07/82			0.370 10/04	0.370 12/07	0.340 03/10	0.140	13.46	14.86
018.U	UT	A	26.00	PIPE	0.625 07/76	0.581 11/02	0.580 02/04	0.580 10/04	0.550 03/09	0.540 01/11	0.140	5.54	72.18
019.U	UT	A	26.00	PIPE	0.625 07/76	0.600 06/98	0.591 11/02	0.580 10/04	0.540 03/09	0.530 01/11	0.140	5.54	70.37
021.U	UT	A	36.00	PIPE	0.380 02/07					0.530 05/10	0.140	0.00	∞
024.U	UT	A	36.00	ELL	0.310 12/99			0.380 10/04	0.390 12/07	0.370 03/10	0.140	8.97	25.63
025.U	UT	A	36.00	PIPE	0.344 11/02		0.360 02/04	0.340 05/06	0.540 03/09	0.530 01/11	0.140	5.51	70.79
026.U	UT	A	36.00	PIPE	0.324 11/02		0.250 06/05	0.330 05/06	0.520 03/09	0.520 01/11	0.140	0.00	∞
027.U	UT	A	36.00	TEE	0.334 08/02	0.320 12/03	0.320 02/04	0.280 03/09	0.280 03/09	0.270 05/11	0.140	7.30	17.81




Division: 590
Address: 3985 TEAL CT
BENICIA, CA. 94510

Date: 5-9-11 Page: 1 of 1
 Job Number: 315606-006
 Purchase Order: N/A
 Reference Number: N/A

Client: CUSA
Address: ON FILE
Contact: JOHN B.
Location: RICHMOND

Part Number:	C-1100
Code/Specification:	ASME SEC V
Procedure:	100-UT-001
Acceptance Criteria:	B31.3
Technique:	ULTRASONIC

	<input type="checkbox"/> Immersion	<input checked="" type="checkbox"/> Contact	<input type="checkbox"/> Thru-Transmission	<input checked="" type="checkbox"/> Thickness Measure
	<input type="checkbox"/> Longitudinal	<input type="checkbox"/> Shear-wave (Angle:)		
	<input type="checkbox"/> C-scan	<input type="checkbox"/> A-scan	<input type="checkbox"/> B-scan	<input type="checkbox"/> Other:

Instrument		
Model	Serial No.	Cal. Due Date
36 DL PLUS	012317412	1-18-12

Transducer		
Frequency	Size	Serial No.
5 MHZ	3/8"	666110

Setup Data					
Reflector	Location	Amplitude	Gate Level		
PRE SET	PRE SET	PRE SET	PRE SET	Cal. Standard:	002
				Scan Equipment:	N/A
				Couplant:	SONO 950
Additional Information					

Additional Information:

Test Results		Quantity Inspected:	Quantity Accepted:	Quantity Rejected:
<p>PERFORMED ULTRASONIC INSPECTION ON OVHD LINE 36" OFF OF C-1100. HAD TO CLOSE GRID AND OR SCAN TML'S 17, 24, & 27 ON DRAWING 0955-003-001.</p>				
<p>NO INDICATION'S FOUND AT THE TIME OF INSPECTION, SEE ATTACHED DRAWING FOR TML LOCATION'S AND UT DATA SHEET FOR READING'S.</p>				
<p><input checked="" type="checkbox"/> Attached Documentation:</p>				
<p>Technician, Level & Date:</p>		<p>Customer (sign):</p>		<p>Management Review (sign):</p>
<p>CLINT EMELIA II 5-9-11</p>				

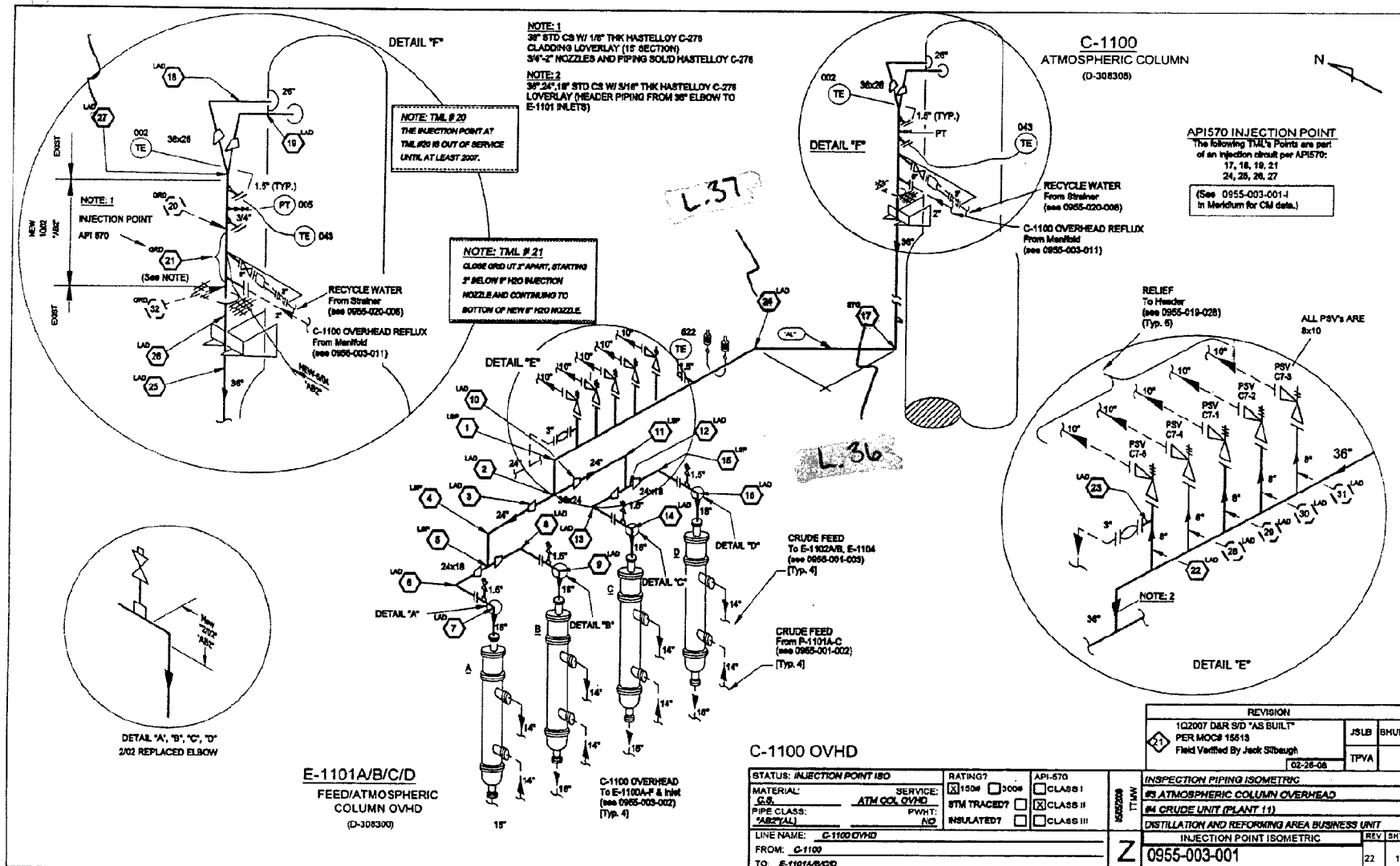


Northern California
2465 Vista Del Monte, Ste. F
Concord, CA 94520
Phone: (925) 685-4991
Fax: (310) 793-7298

TML	READING
17	0.36 LOW
24	0.37 LOW
27	0.27 LOW

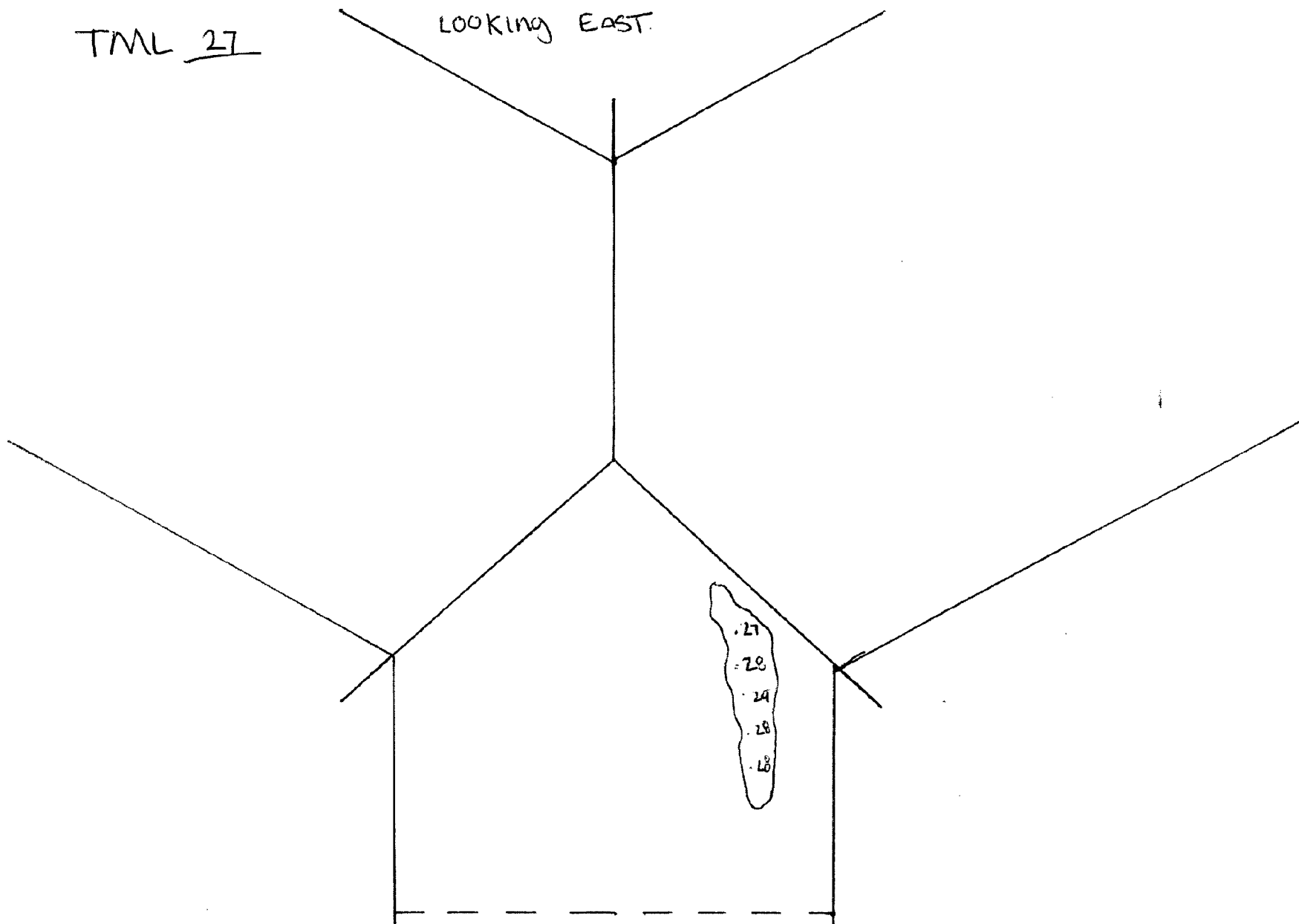
Signature 

L-27



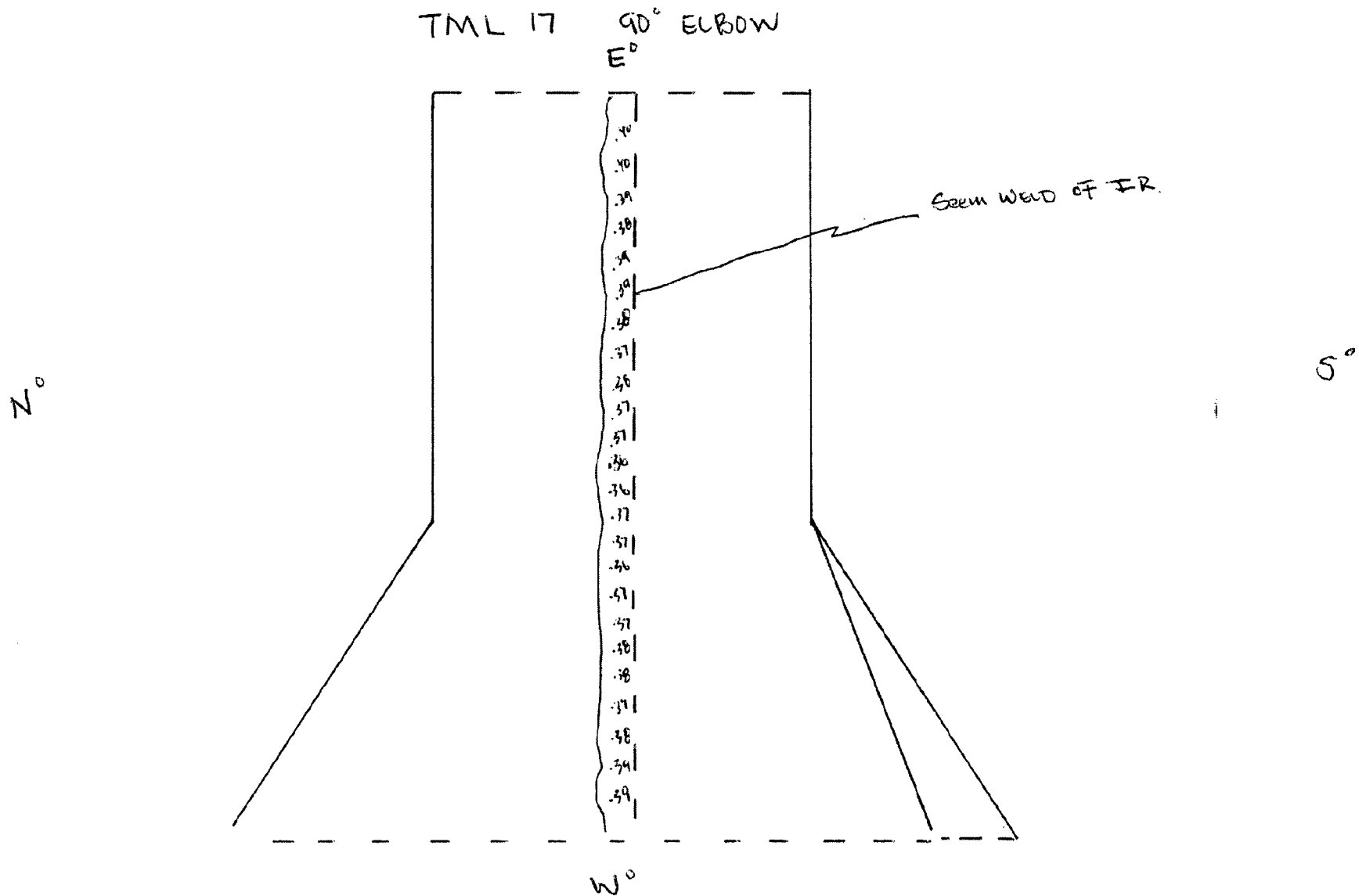
TML 27

LOOKING EAST.



Pacific Technical Services <small>Creating the Future & Sustaining the Past</small>	Client: CUSA	Unit: DIR 4 CRIDE	Technician: C Emelina
	Equipment: OVRD C1100	Comments: CENT OR SW	Date: 5-9-11

PTS-0003 REV. 03/07

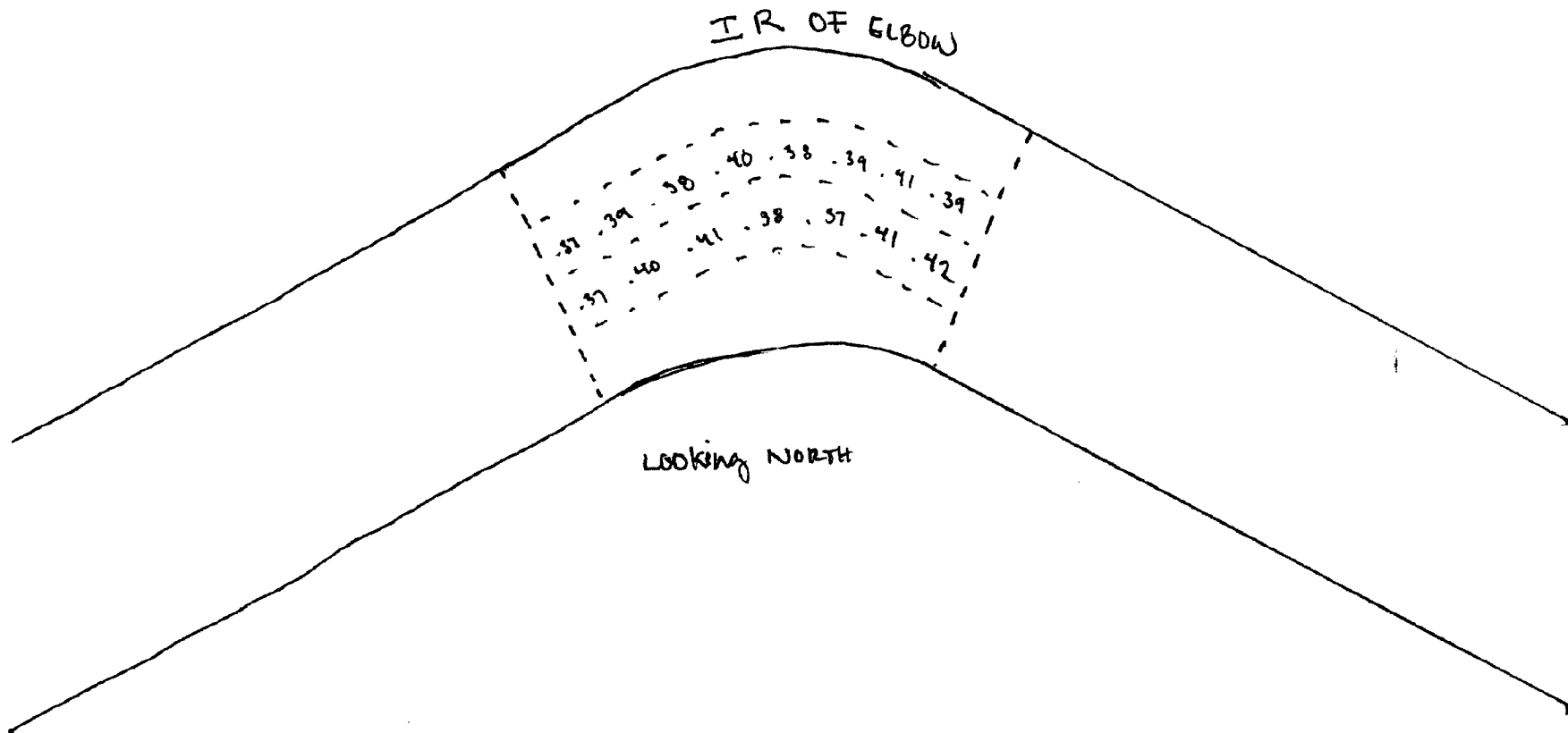


LOOKING EAST INTO C1100

Pacific Technical Services <small>Specialized Services & Construction Solutions</small>	Client: CUSA	Unit: D/R HORDE	Technician: C EMELIA
	Equipment: OVHD Line 36"	Comments: CENT : SCAN	Date: 5-9-11

PTS-0003 REV. 03/07

TML 24 30° ELBOW



<div>Pacific Technical Services</div> <div><small>Serving the Heavy Construction Industry</small></div>	Client: CUSA	Unit: D.R. 4000R	Technician: C. Melra
	Equipment: DHD LWR 36"	Comments: Cast & scan	Date: 5.9.11

PTS-0003 REV 03/07



**CHEVRON
RICHMOND FACILITY
AUT REPORT
CRUDE OVERHEAD
LINE
APRIL 2011**



AUT INSPECTION RICHMOND FACILITY APRIL 2011

Client: Richmond Facility
Location: Richmond, CA USA
Item: Crude Overhead line
Unit: 4 Crude
Inspector: John Beauregard
AUT Operators: Mr. Adam Maltzberger

Inspection Overview:

On April 27th. of 2011 Chevron Richmond Facility requested that ETC perform Automated Ultrasonic Testing (AUT) on the Crude Overhead Line. The Unit Inspector Mr. John Beauregard selected random areas of the line to be examined. This inspection was performed to give an idea of the overall damage that could exist in the piping currently. Attached are drawings showing the locations of all scans along with a colored C-scan image detailing the thickness ranges of the piping wall.

Inspection Specifications:

A longitudinal wave automated ultrasonic instrument was used for the examinations. The instrument is capable of storing all A-scan waveforms while displaying both B & C-scans for review. The instrument was encoded to track all locations in the X and Y position. A focused 10MHz, ½" diameter immersion transducer was utilized to propagate ultrasound into the Piping. The transducer was incremented 0.100" (X-axis direction) x 0.100" (Y-axis direction) while acquiring all the data. All ultrasonic parameters are stored on the system for further review if required.

Inspection Results:

Please refer to Drawings / Pictures for Section Layouts

Section #1 Results:

After the AUT data was acquired and analyzed it is determined that corrosion exists in all areas scanned.. The low for all scans is a 0.302" found in scan F4. All low areas detected are determined to be actual corrosion and not laminar reflectors. *Note: There was no paint/coating on the pipe at time of inspection, but some rust/scale was noticed. Minimum thickness, average thickness and scan dimensions for each scan are noted below:

Note: Scan F1 had to be separated from the merged C-scan image, due to the dramatic thickness change caused by the Hastelloy liner.

Scan #	Minimum Thickness	Average Thickness	Scan Lengths	Scan Widths
F1	0.500"	0.548"	114.0"	20.0"
F2	0.328"	0.383"	114.0"	20.0"
F3	0.328"	0.380"	92.0"	20.0"
F4	0.302"	0.355"	70.5."	20.0"

Section #2 Results:

After the AUT data was acquired and analyzed it is determined that corrosion exists in the area scanned. The low for this scan is a 0.318". All low areas detected are determined to be actual corrosion and not laminar reflectors. *Note: There was no paint/coating on the pipe at time of inspection, but some rust/scale was noticed. Minimum thickness, average thickness and scan dimensions for each scan are noted below:

Scan #	Minimum Thickness	Average Thickness	Scan Lengths	Scan Widths
F1	0.318"	0.379"	114.0"	20.0"

Section #3 Results:

After the AUT data was acquired and analyzed it is determined that corrosion exists in all areas scanned. The low for all scans is a 0.297" found in scan F1. All low areas detected are determined to be actual corrosion and not laminar reflectors. *Note: There was no paint/coating on the pipe at time of inspection, but some rust/scale was noticed. Minimum thickness, average thickness and scan dimensions for each scan are noted below:

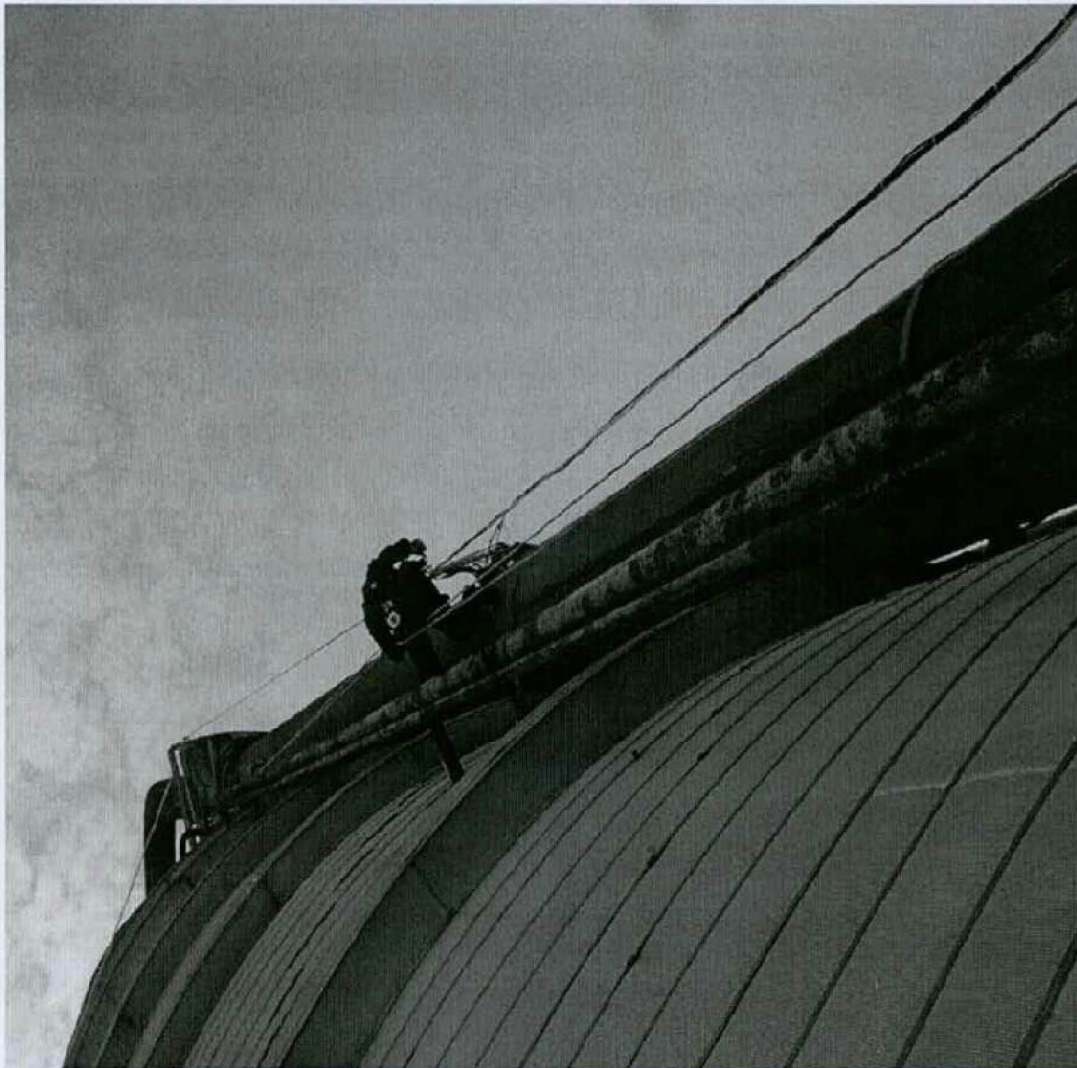
Scan #	Minimum Thickness	Average Thickness	Scan Lengths	Scan Widths
F1	0.297"	0.377"	114.0"	20.0"
F2	0.312"	0.379"	114.0"	20.0"
F3	0.329"	0.380"	114.0"	20.0"

All scan areas are marked on the piping and can be referenced via the supplied drawings

Inspectors Signature: *Adam Maltisberger* 04-29-2011

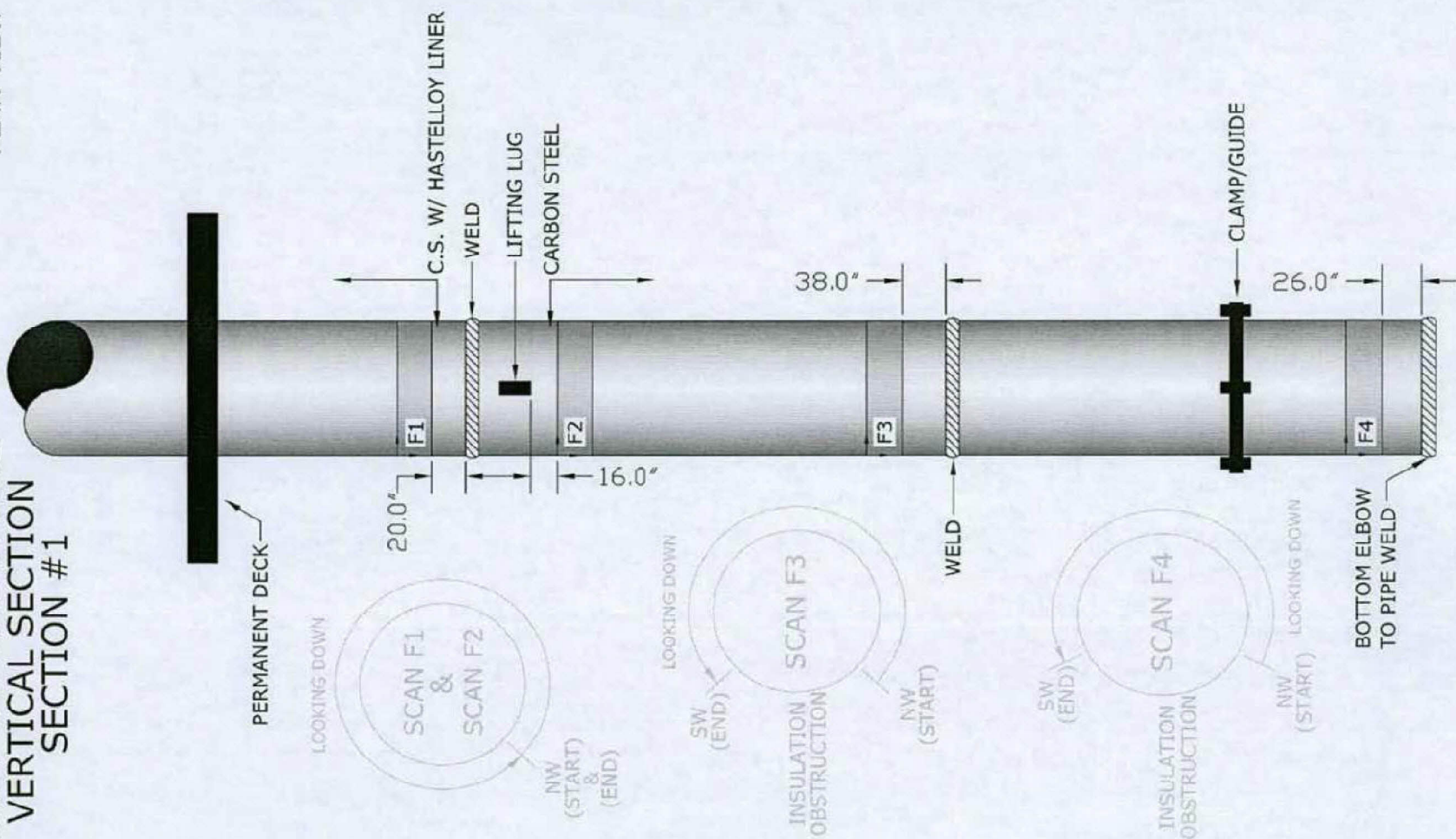


CRUDE OVERHEAD LINE VERTICAL SECTION (SECTION #1)



CRUDE OVERHEAD LINE VERTICAL SECTION SECTION #1

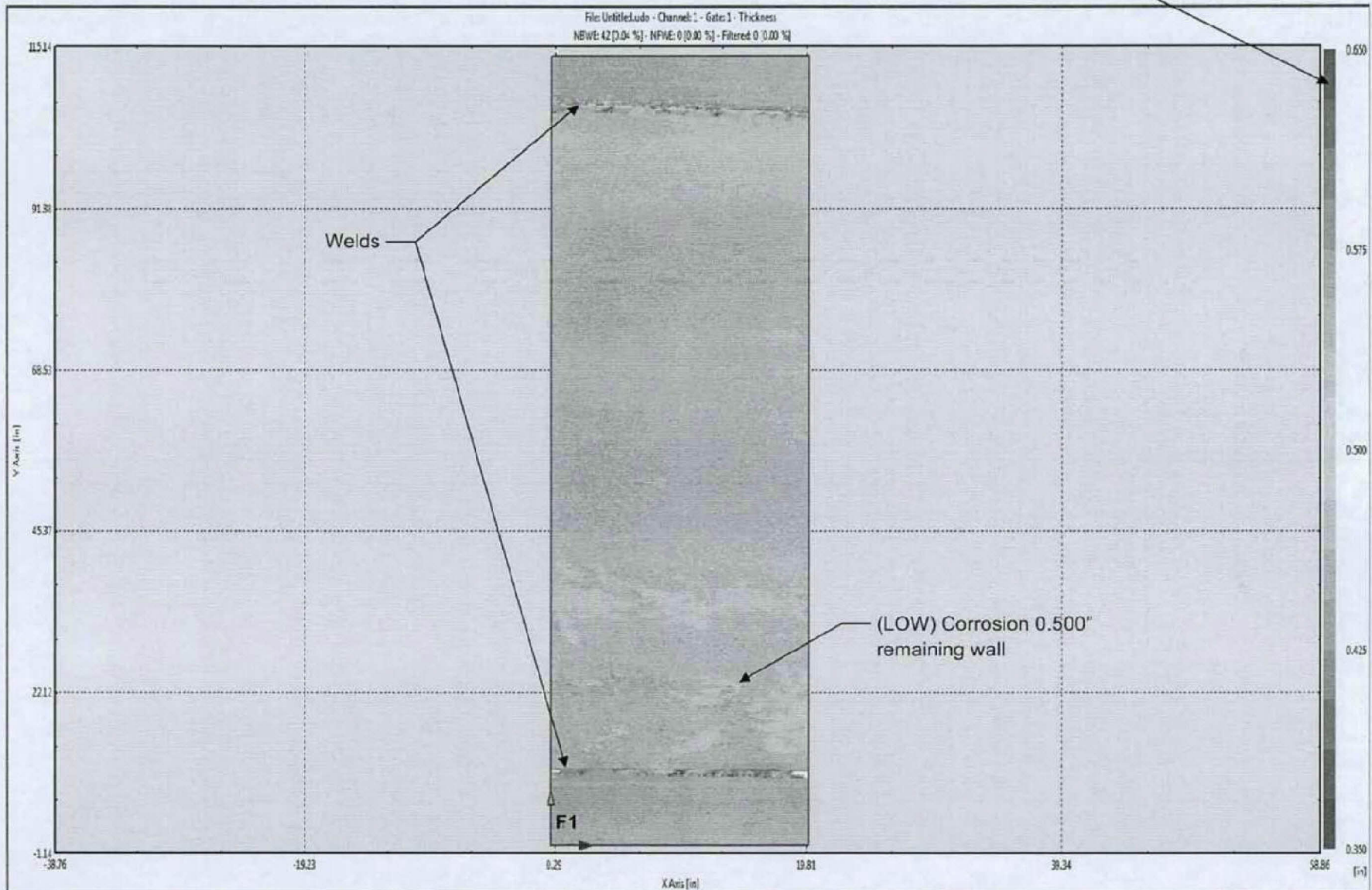
PLAN VIEW



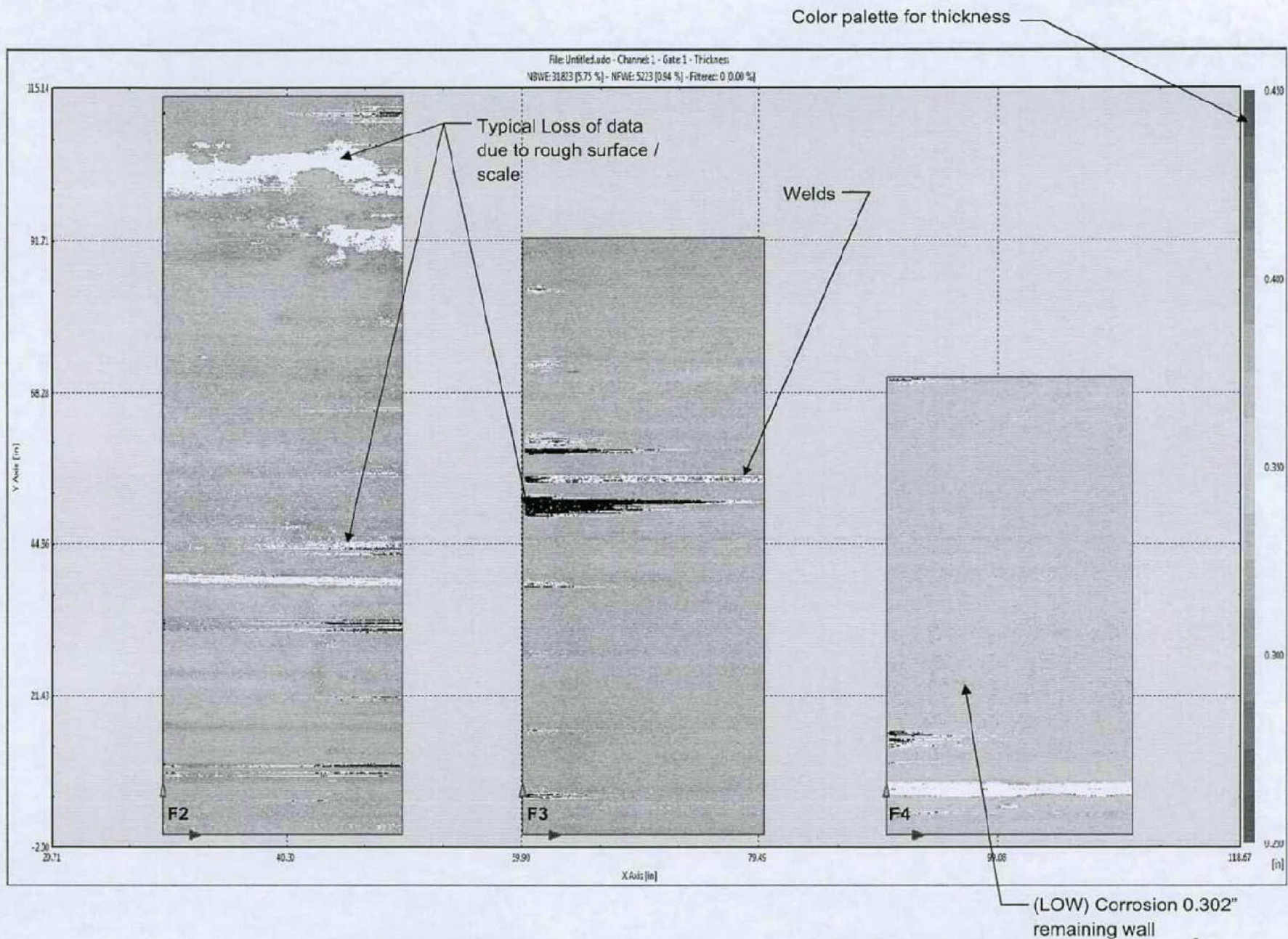
CHEVRON CORPORATION
NDE DIVISION
510-242-2690

DESCRIPTION	AUT MAPPING	CLIENT	RICHMOND FACILITY	
LINE #	CRUDE OVERHEAD LINE			
INSPECTION	AUT			
INSPECTED BY:	ADAM MALTSBERGER	DATE:	APRIL 2011	DRAWN BY: MALTS.
FOR REPORT & INSPECTION TRACKING				JERB AXI

Color palette for thickness



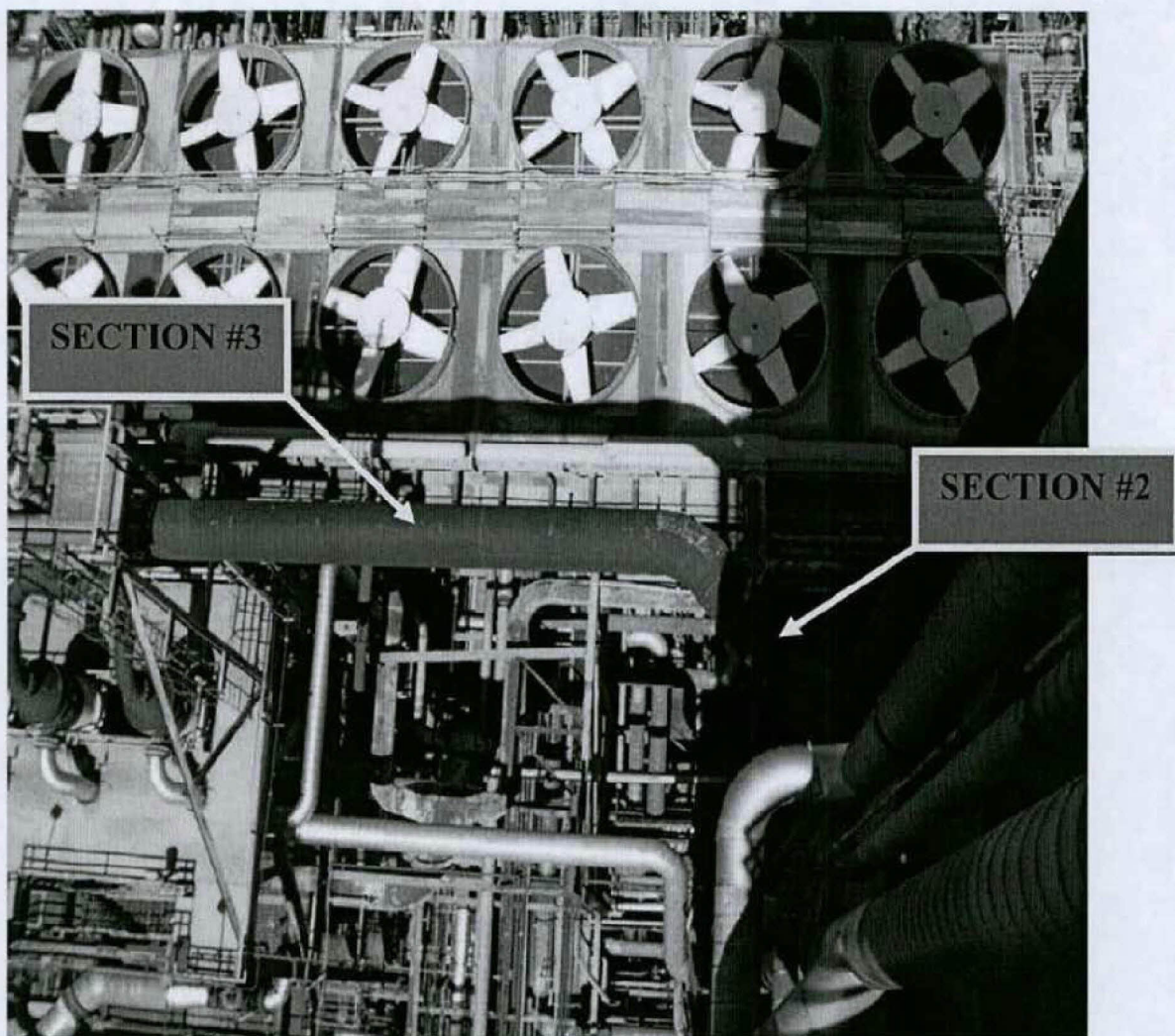
CRUDE OVERHEAD LINE SECTION #1 (SCAN F1)

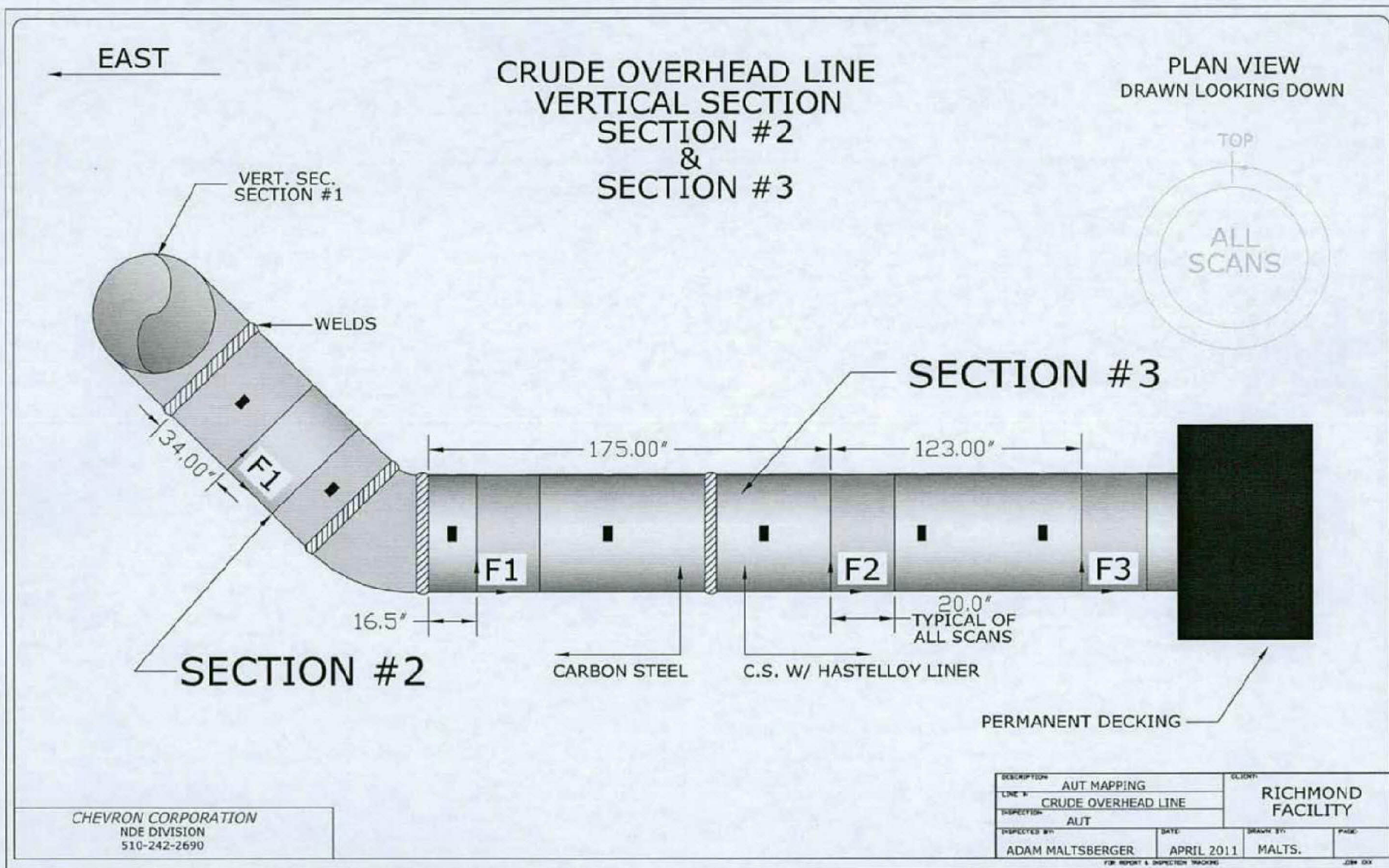


CRUDE OVERHEAD LINE SECTION #1 (SCANS F2-F4)

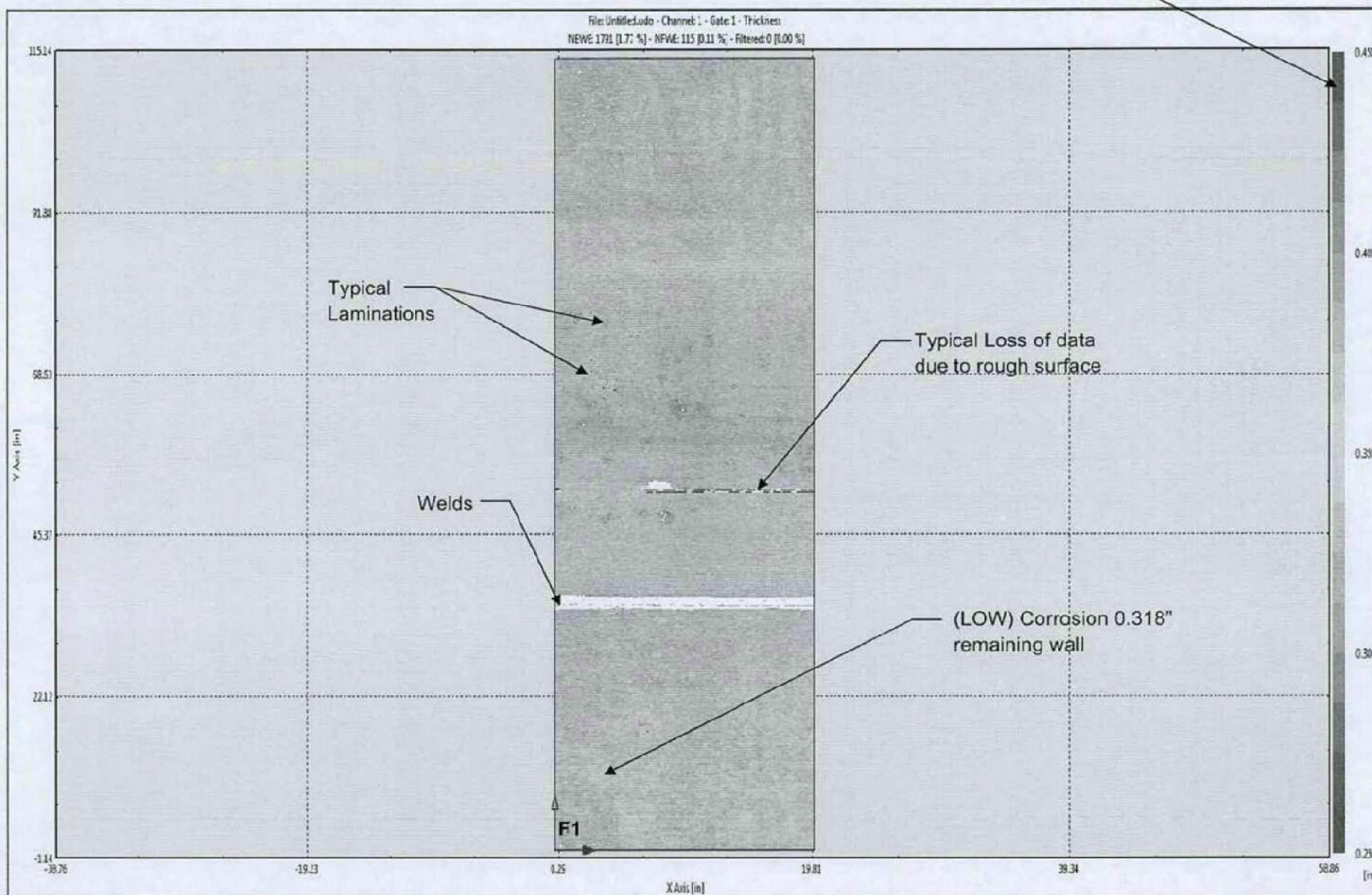


CRUDE OVERHEAD LINE HORIZONTAL SECTION (SECTION #2 & #3)

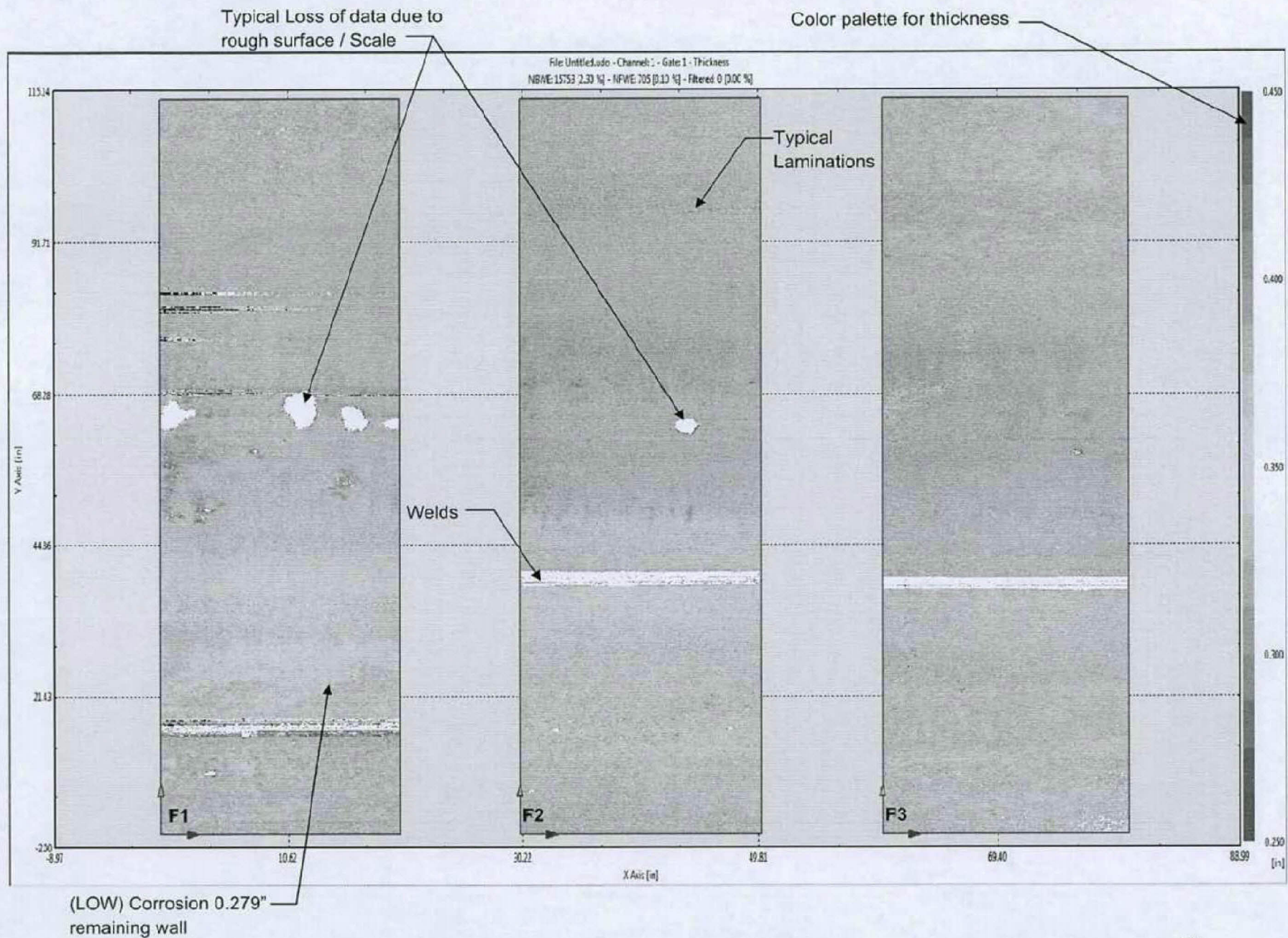




Color palette for thickness



CRUDE OVERHEAD LINE SECTION #2



CRUDE OVERHEAD LINE SECTION #3

Crude unit overhead line inspection 5/11/2011

(0955-003-001) <http://ric841dwgs.ric841.chevrontexaco.net/dwgs/insp/0955-003-001.dwf>

Inspection summary:

The Crude Overhead line has two sections that were replaced during the 2007 S/D due to internal corrosion at the inlet elbow to E-1101D. There are two areas protected with a corrosion resistant hastelloy weld overlay as noted on the drawing. These areas appear to be nominal thickness with no detectable active corrosion. The inspection was concentrated on the unprotected Carbon steel areas of the vertical and horizontal run of the overhead line. These areas are actively corroding please see corrosion rate and remaining life calculations below. Current Remaining Life using Refinery Replacement Thickness for the thinnest area is 78 years located on section 3. The elbows were inspected by hand using a 1" x 1' grid pattern. This is the first AUT scan of this area so we are using a long term corrosion rate. We will scan this area again prior to the 2016 S/D to determine the short term corrosion rate at a repeatable location.

.375" nominal thickness

.297" worst location found

.078" recorded loss from 1976 because this is the first AUT inspection of these locations

.002" per year based on long term corrosion rate from 1/1976 – 5/2011.

A remaining life to 0.140" in thickness is calculated to be 78 years at the current corrosion rates.

Hand UT Scan was performed on the elbows due to geometry and inability of using the AUT machine. CML 27 at the Y connection near the top of C-1100 above the hastelloy overlay has an area that is corroding at 0.007" per year short term and a remaining life of 17 years. We re-inspect this area every 3 years because it is an injection point and we will monitor as needed. There is no recommendation for the Oct. 2011 event at this time.

Inspection Overview:

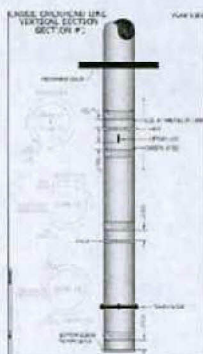
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Inspection Specifications:

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Inspection Results:

Please refer to Drawings / Pictures for Section Layouts



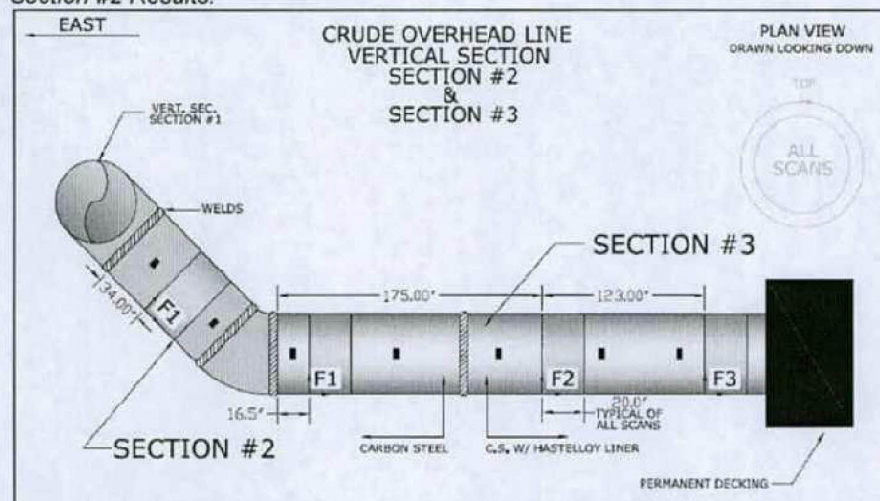
Section #1 Results:

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Note: Scan F1 had to be separated from the merged C-scan image, due to the dramatic thickness change caused by the Hastelloy liner.

Scan #	Minimum Thickness	Average Thickness
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F2	0.328"	0.383"
F3	0.328"	0.380"
F4	0.302"	0.355"

Section #2 Results:



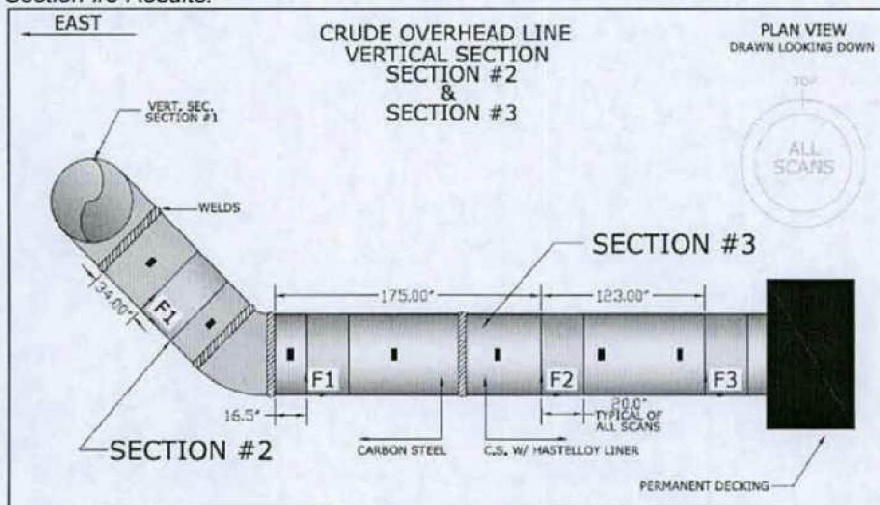
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Scan #	Minimum Thickness	Average Thickness
--------	-------------------	-------------------

F1

0.318"

0.379"

Section #3 Results:

After the AUT data was acquired and analyzed it is determined that corrosion exists in all areas scanned. The low for all scans is a 0.297" found in scan F1. All low areas detected are determined to be actual corrosion and not laminar reflectors. *Note: There was no paint/coating on the pipe at time of inspection, but some rust/scale was noticed. Minimum thickness, average thickness and scan dimensions for each scan are noted below:

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F2	0.312"	0.379"
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